**Course 4: “Dry Strength of Paper,” Final Quiz**

**Complete the following form and take the quiz to receive a certificate of course completion. Please enter your information in the way you would like it to appear on your certificate. Send your completed form (in WORD or PDF format) as an email attachment to hubbe@ncsu.edu.**

**Your full name (print carefully or type):**

**Your affiliation (school, company, etc.):**

**Your email address:**

**Having taken this course will help me to…**

**This course could be improved by…**

**My idea for a future course in this series would be…**

FINAL QUIZ FOR COURSE 4 (ten questions)

1 – In which case is it expected that many fibers will be broken during tearing of a sheet of paper?

1. Low inter-fiber bonding level
2. Low level of refining
3. When the breaking length is very low
4. High inter-fiber bonding level

2 – Which of the following parameters is proportional to the capillary suction force pulling fibers together as paper is being dried?

1. Gamma (γ), the interfacial tension of the water
2. x, the distance between two fiber surfaces
3. Lower-case delta (δ), the density of hydrogen bonding
4. Lower-case g, the acceleration of gravity

3 – Which of the following terms is a measure of paper’s tensile strength?

1. Apparent density
2. Breaking length
3. Hydrogen bonding
4. STFI compression

4 – Why is cationic starch attracted to cellulosic fiber surfaces?

1. Attraction of positively charged starch to negatively charged fiber surfaces
2. Attraction of negatively charged starch to positively charged fiber surfaces
3. Chemical similarity of the starch and cellulose polysaccharide molecules
4. Preferential hydrogen bond formation between the surfaces

5 – What chemical groups provide a negative charge at the surface of typical papermaking fibers?

1. Hydroxyl (–OH)
2. Methoxyl (–OCH3)
3. Primary amine (-NH2)
4. Carboxyl (–COOH)

6 - What is the sign of charge of soluble species of aluminum at a pH near to 4?

1. Neutral
2. Undefined
3. Positive
4. Negative

7 – To get the greatest positive impact on paper’s strength, where do you want the dry-strength agent to be situated?

1. On cellulosic fines
2. In the process water
3. On the long fibers
4. Within the lumens of fibers

8 – When using a gPAM product for temporary wet strength, what type of bond comes apart when the paper is place in water (e.g. for 30 minutes)?

1. Covalent (hemi-acetal)
2. Ionic (amine groups and carboxyl groups)
3. Metallic (aluminum hydroxide)
4. Conjugated (double C=C and single C-C bonds)